Honey Bee Integrated Pest Management (IPM)

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How do we prevent this?

WHAT HAPPENED? STARVATION

WHAT HAPPENED? DRONE LAYER

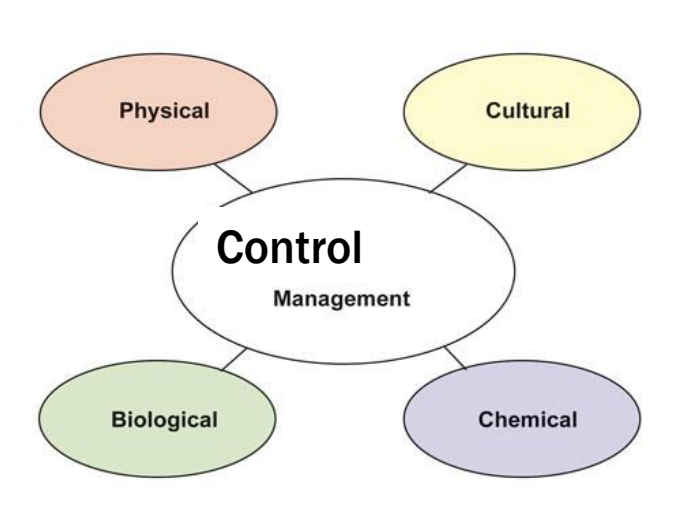
WHAT HAPPENED? LAYING WORKER

INTEGRATED PEST MANAGEMENT

- "Integrated Pest Management is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices." – EPA

4 Steps:

- Proper Identification and Monitoring
- Set Action Threshold
- Prevention
- Control – Least toxic controls.



Four types of control in IPM

PREVENTION

- The easiest pest problem to control is the one that you don't have!!!!!
  - NEW EQUIPMENT
  - HIGH QUALITY BEES AND QUEENS – Hybrid queens/Russian genetics?
  - GOOD LOCATION- Sunny and dry?? Food and water!
  - Mite resistant bees?

HONEY BEE PESTS

- American Foulbrood (AFB)
- Varroa Mites
- Nosema

Primary Problems in Montana

- Viruses
- Tracheal Mites
- European Foulbrood (EFB)
- Chalkbrood

Minor problem or unknown impact

- Wax Moth
- Small Hive Beetle
- Africanized Honey Bees

Don’t occur in MT or not a problem

AMERICAN FOULBROOD

- Caused by the bacterium *Paenibacillus larvae.*
  - Only infects larvae.
  - Spores will not germinate if larvae are infected beyond 3 days of age.
  - Larvae less the 24 hours old are most susceptible.
  - Each dead larva can contain 1 million spores
- Most destructive and widespread brood disease.
- Regulated bee disease under Montana law.
- Infested hives can be quarantined and destroyed.
- Spores can live in woodenware for around 80 YEARS!!!
  - DON'T BUY USED EQUIPMENT!!!
  - ROTATE out old equipment.

AMERICAN FOULBROOD

AMERICAN FOUL BROOD

- Treatments are preventative NOT a CURE.
- ONLY CURE is to destroy the infected material including woodenware.
- Resistant AFB?
- Save bees?

"PREVENTATIVE ANTIBIOTICS"

AFB PROBLEMS

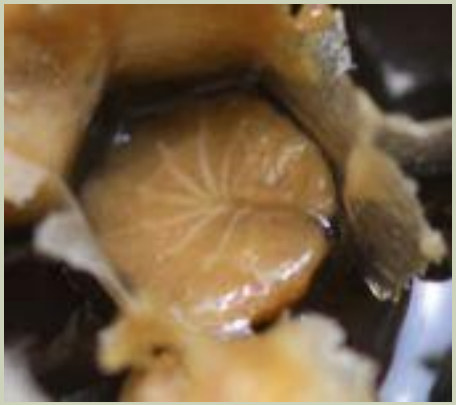
- Montana City/East Helena/Helena Valley
- 7 Hobbyists (2 were not registered) in a small area surrounded by commercial sites
- 7 hives burned by the beekeepers at the request of the Department
- What happens if none of these beekeepers are registered? (only 2 were registered)

EUROPEAN FOULBROOD

- Caused by the bacterium *Melissococcus plutonius.*
- Infects bee larvae. Larvae die BEFORE being capped.
- Much less deadly than AFB.
- A healthy colony can usually survive EFB if other stresses are absent.

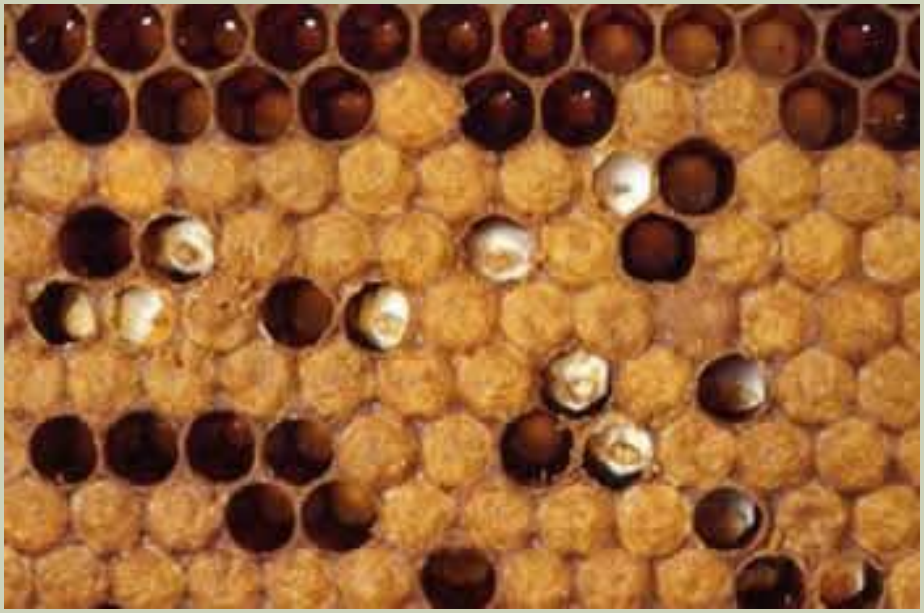
- Dead larvae can appear curled upwards, brown or yellow, melted or deflated and dried out or rubbery. NOT “ropey”.

- “Brown Rot” or “Snotty Brood”?



CHALKBROOD

- Fungal disease caused by *Ascosphaera apis*
- Infects the larval gut competes with the larva for food and the consumes the larva causing it to appear white and “chalky”.
- Does not kill hives and the bees will clean up the cells.
- Most common during cool and wet springs like 2010.



VARROA MITES

- External parasite that attacks both adult bees and the developing larvae.
- Natural parasite of the Asian Honey Bee, *Apis cerana*
- First found in the US in 1987 in Florida, and quickly spread to all other US States and Canadian Provinces.

VARROA MONITORING

- Natural drop onto sticky board
- Powdered Sugar
  - Sticky board or shaker
- Alcohol wash
- 300 bees/ shake and count mites

VARROA MITES: CULTURAL

- Screened bottom boards
  - Sticky traps
- Drone trapping!!!!!
- Small cell size?

VARROA CHEMICALS: "HARD"

Fluvalinate
RESISTANCE
Residues in pollen, wax

Coumaphos
1 strip enough to kill a person
RESISTANCE
Residues in pollen, wax
Harmful to bees

Others NOT CURRENTLY LABELED in MONTANA: Hivastan, Amitraz, Sucrocide.

If using CheckMite+ or Apistan, MUST rotate other products.

VARROA CHEMICALS: "SOFT"

NEW for 2011 MAQS

Formic Acid
No residues in honey or combs
Queens stop laying for a few days
Can't use when temps above 80F
No resistance

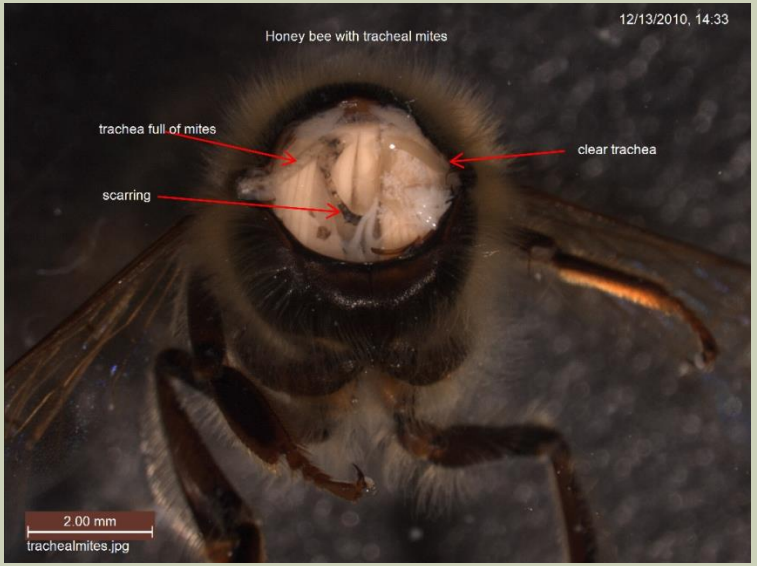
Thymol (oil of thyme plant)
No residues in honey or combs
Minor brood kill
No resistance

Others NOT CURRENTLY LABELED in MONTANA: Oxalic Acid, HopGuard.

BetaTec™ hop products

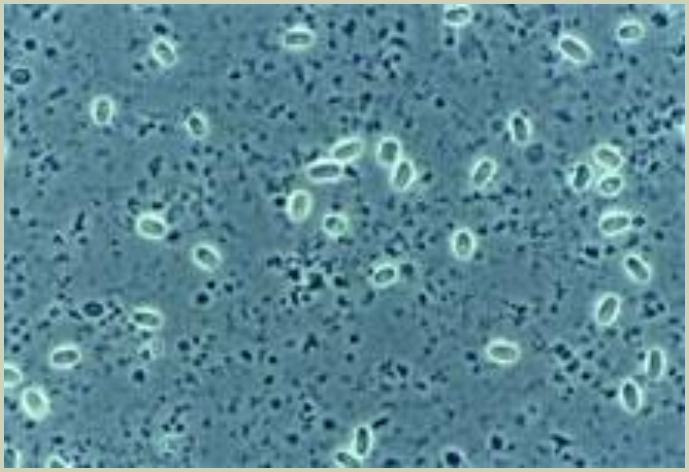
TRACHEAL MITES

- Internal mite parasite, *Acarapis woodi*
- Live and reproduce in the trachea (breathing tubes) of honey bees
- Feed on the bees blood
- Weaken the bees
- Control: Grease patties (typically made from 1 part vegetable shortening mixed with 3–4 parts powdered sugar) placed on the top bars of the hive. Physical barrier mites can't infect new bees.
- Control: Thymol, other essential oils, and other varroa treatments may control.



NOSEMA

- Microsporidian.
- Spores must be ingested to infect adult bees.
- Bee dysentery.
- *Nosema apis* has been replaced by *N. ceranae* across most of US and in commercial MT operations.
- *Nosema ceranae* implicated in CCD.
- Impairs the digestion of pollen and shortens the life of bees.



NOSEMA CONTROLS

- New foundation or disinfected comb
  - Electron beam irradiation (some in CA)
  - heat 120 deg F for 24 hours
  - Acetic Acid fumigation
- Fumagillin (Fumagilin-B)
  - Does not KILL spores only inhibits them from reproducing.

- Essential oils…..

VIRUSES

- Acute bee paralysis virus (ABPV) or (APV)
- Israel acute paralysis virus (IAPV)
- Kashmir bee virus (KBV)
- Black Queen Cell Virus (BQCV)
- Chronic Paralysis Virus [CPV]
- Cloudy Wing Virus (CWV)
- Deformed Wing Virus (DWV)
- Sacbrood virus (SBV)
- Kakugo virus (KV)
- Varroa destructor virus 1
- Invertebrate iridescent virus type 6 (IIV-6)
- Etc……..

- Sunny and dry apiary sites may limit viral loads? California fog has been suggested to increase viral loads.

COLONY COLLAPSE DISORDER (CCD)

PESTICIDES

- Insecticides are designed to kill insects, bees are insects. Most insecticides are very good at killing bees.
- EXPOSURE
- 25+ pesticides commonly found in beehives including those put in there by the beekeeper!!

- Fungicides? Fungicides in the hives affect the development of bee bread. Fungicides are used very heavily in almond groves.
- Ongoing research on fungicides and systemic insecticides.

BEE CAUTION: MAY KILL HONEY BEES IN SUBSTANTIAL NUMBERS

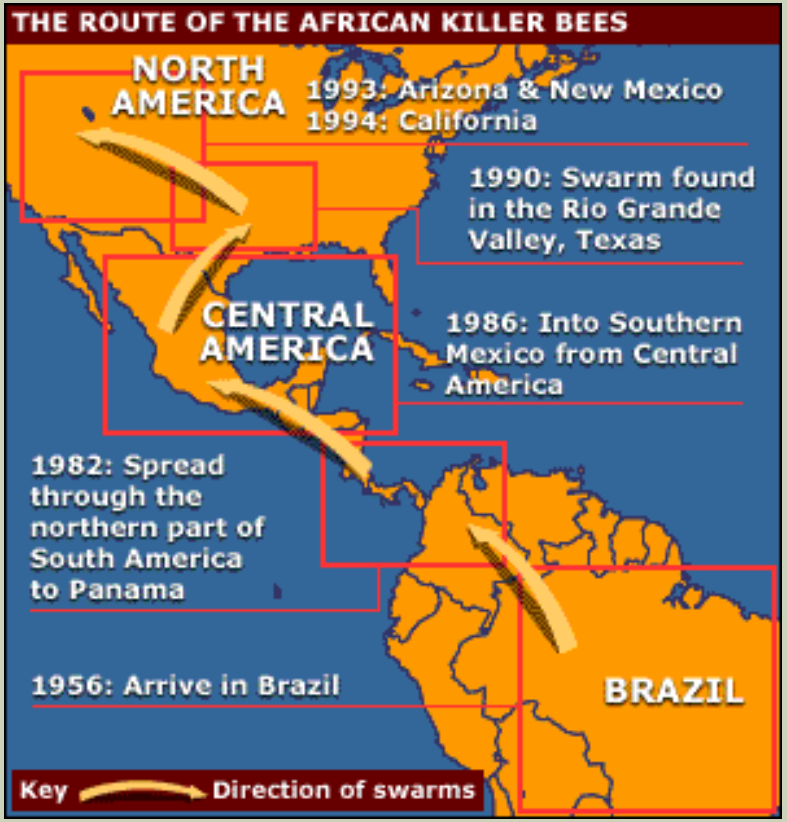
- This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area.

MDA Guidelines

- Locate apiary sites- **Easier if the site is registered!!!**
- Communication
- Less toxic if possible
- Timing and Temperature

Activity	SPRAY	NO SPRAY	SPRAY
Plant	 bud	 bloom	 petal fall
Attractiveness To Bees	NOT ATTRACTIVE	ATTRACTIVE	NOT ATTRACTIVE

AFRICANIZED OR KILLER BEES



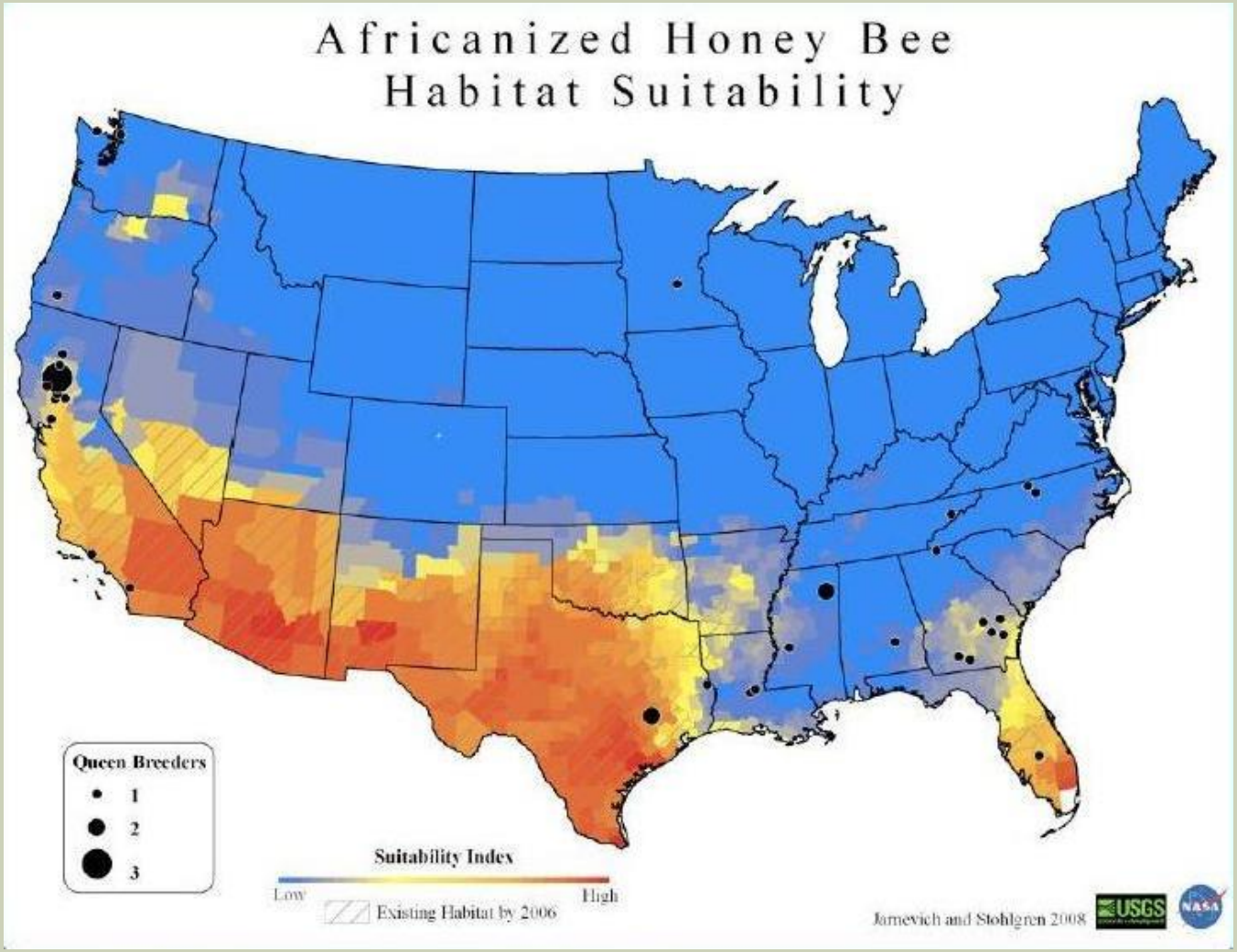
- Found in Georgia in 2010. Near large package bee producers
- Diagnosing AHB colonies is getting more and more difficult in SE US
- More and more gene flow and more and more hybrid colonies

Not easy to ID

Kick test?

- In Southern Utah in the West

AFRICANIZED HONEY BEES (AHB)



SMALL HIVE BEETLE

- From South Africa
- 1st found in Florida in 1998
- Widespread in SE and Midwestern US
- Populations in Minnesota and Ontario, Canada
- Not recorded from Montana
- Feed on honey, pollen, and developing brood
- Tunnel through wax and muck up the hive
- GROSS!!!

SMALL HIVE BEETLE LARVAE

WAX MOTHS

- Old woodenware damaged by wax moths has tunnels in it
- All life stages of the moth killed by freezing temperatures
- Not a problem in MT
- Damaged migratory equipment

HEALTHY BEES?

- START with healthy bees from high quality stock
- Diverse nutritional sources
  - Pollen substitutes
  - Multiple pollen sources
- Leave plenty of honey!!!! OR feed sugar syrup
  - Dark honey has indigestible parts and bees need to take cleansing flights
  - Sugar syrup almost 100% digestible
- Medium super= about 40 lbs of honey, Deep hive body= about 60 lbs of honey
- In Montana how much honey should you leave? 50-100 lbs?